

AMENDMENT TO THE ENVIRONMENTAL ASSESSMENT
REDUCING DOUBLE-CRESTED CORMORANT DAMAGE
THROUGH AN INTEGRATED WILDLIFE DAMAGE MANAGEMENT PROGRAM
IN THE STATE OF MICHIGAN

June 2006

I. INTRODUCTION

Across the United States, wildlife habitat has been substantially changed as the human population expands and more land is used to meet human needs. These human uses often come into conflict with the needs of wildlife and increase the potential for negative human/wildlife interactions. Double-crested cormorants (hereafter, DCCOs; see Appendix A for a list of acronyms) are one of the wildlife species that engage in activities which conflict with human activities and resource uses. Conflicts with DCCOs include but are not limited to DCCO foraging on fish at aquaculture facilities, DCCO foraging on populations of sport fish, negative impacts of increasing DCCO populations on vegetation and habitat used by other wildlife species, damage to private property from DCCO feces, and risks of aircraft collisions with DCCOs at or near airports. Wildlife damage management is the science of reducing damage or other problems associated with wildlife and is recognized as an integral part of wildlife management (The Wildlife Society 1992). In response to persistent conflicts and complaints relating to DCCOs, in 2003 the United States Department of Interior, Fish and Wildlife Service (USFWS) in cooperation with the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS) completed a final Environmental Impact Statement (FEIS) on the management of DCCOs in the United States (USFWS 2003).¹ The selected management alternative included the establishment of a depredation order to address conflicts regarding DCCO impacts on public resources.

Public Resource Depredation Order (PRDO): The purpose of this order is to reduce the actual occurrence, and/or minimize the risk, of adverse impacts of DCCOs to public resources. Public resources include fish (both free-swimming fish and stock at Federal, State, and tribal hatcheries that are intended for release in public waters), wildlife, plants, and their habitats. It authorizes WS, State fish and wildlife agencies, and Federally-recognized Tribes to control DCCOs, without a Federal permit, in 24 states (AL, AR, FL, GA, IL, IN, IA, KS, KY, LA, MI, MN, MS, MO, NY, NC, OH, OK, SC, TN, TX, VT, WV, and WI). It authorizes control on “all lands and freshwaters.” This includes private lands, but landowner permission is required. It protects “public resources,” which are natural resources managed and conserved by public agencies, as opposed to private individuals. Regulations implementing the PRDO are codified at 50 CFR 21.48 (see <http://www.fws.gov/migratorybirds/issues/cormorant/FinalRule/fed1regdccofinalrule.pdf>)

In 2004, WS and the USFWS also prepared an Environmental Assessment (EA) for reducing DCCO damage to aquaculture, property, natural resources, and human health and safety on private and public lands in Michigan (USDA 2004)². The EA was tiered to the national EIS and analyzed the potential

¹ The EIS is available at: <http://migratorybirds.fws.gov/issues/cormorant/cormorant.html>.

² The 2004 Michigan EA is available at USDA-Wildlife Services, 2803 Jolly Rd - Suite 100, Okemos, MI 48864 and at <http://www.fws.gov/midwest/MICormorantNEPA>.

environmental and social effects of alternatives for resolving DCCO damage related to the protection of resources, and health and safety on private and public lands throughout the State. Comments from the public involvement process were reviewed for substantive issues and alternatives which were considered in developing the alternatives and selecting the final management decision. The alternative selected in the WS and USFWS Decisions and Findings of No Significant Impact (FONSIs) involves the use of an integrated wildlife damage management (IWDM) approach, including non-lethal and lethal methods to manage DCCO damage. The EA analyzed potential effects of cormorant damage management (CDM) activities which could occur at private and public property sites or facilities within Michigan wherever such management is requested from the WS program. It also addressed the impacts of CDM in areas where additional agreements may be signed in the future, and the cumulative effects of other agencies' CDM activities. Because the proposed action was to reduce damage and because the program's goals and directives were to provide services when requested, within the constraints of available funding and workforce, it was conceivable that additional CDM efforts could occur. The EA anticipated this potential expansion and analyzed the impacts of such efforts as part of the program. However, requests for assistance with DCCO damage to public resources in Michigan have been greater than anticipated in the EA. Wildlife Services is preparing this amendment to the EA to examine the environmental impacts of alternatives for responding to the increased need for CDM in the State. One of the sites where CDM may be conducted is on USDI, National Park Service lands, and the NPS has joined as a cooperating agency in the preparation of this amendment. This analysis is in addition to that in the 2004 EA and FONSI and all information and analyses in the 2004 EA remain valid unless otherwise noted below.

I. NEED FOR ACTION

1.1 Need for CDM to Protect Fishery Resources

As stated in the FEIS (USFWS 2003), the recent increase in the North American DCCO population, and subsequent range expansion, have been well-documented. Wires et al. (2001) and Jackson and Jackson (1995) have suggested that the current DCCO resurgence may be, at least in part, a population recovery following years of DDT-induced reproductive suppression and unregulated take prior to protection under the Migratory Bird Treaty Act (MBTA). The potential for increased numbers of DCCOs to adversely impact fishery resources is described in the FEIS (USFWS 2003) and the 2004 EA for CDM in Michigan (USDA 2004). This section provides current information on research regarding DCCO impacts on fishery resources, information on CDM actions that have been conducted since the completion of the EA (USDA 2004) and specific locations in Michigan where WS has been requested to provide assistance. However, as stated in the EA, this analysis evaluates CDM by WS to protect aquaculture, property, natural resources, and human health and safety on private and public land or facilities within the State wherever such management is requested from the WS program. WS' actions are not restricted to the sites noted below so long as the impacts of the actions do not exceed the parameters analyzed in the EA and amendment.

In Michigan, there are two situations where high densities of DCCOs are believed to cause damage to fishery resources. The first occurs during spring migration when a large pulse of birds moves through the state. In some instances, DCCOs forage extensively in areas where fish are spawning in shallow water and are very vulnerable to DCCO predation. As permitted in Alternative 1 of the EA, WS has developed a program that combines harassment with pyrotechnics and boats with limited lethal shooting to decrease the amount of DCCOs in areas where fish populations appear to be particularly vulnerable. These efforts are conducted during the migration peak in mid April and

early May. This approach has been used at Drummond Island, Brevoort Lake, Long Lake and Grand Lake and appears to be quite successful. Information from participants in the hazing program at the Drummond Island area in 2004 and 2005 indicates this plan has prevented approximately 98% and 82%, respectively, of the DCCOs that approach the site from foraging in the protected area. Unfortunately, this CDM strategy can be very labor intensive because it requires the presence of humans to harass and shoot for extended periods of the day, especially in the morning. Wildlife Services has enlisted the help of private citizens (as designated agents of WS) to do the majority of the work in these situations. The brown trout release by Michigan DNR at Rockport in June will be protected with a similar harassment/shooting effort. The brown trout remain close to shore where they are vulnerable to DCCO predation for up to several weeks after release. WS has received new requests for similar projects at Manistique Lake and South Manistique Lake in Mackinac County and Indian Lake in Schoolcraft County.

The second situation where high DCCO densities appear to be having an adverse impact on fish populations involves birds at nesting colonies. The foraging needs of high densities of breeding and non-breeding adults and chicks increase the potential for adverse impacts on fish populations in the vicinity of the breeding colony depending upon the conditions at the site (USFWS 2003). On Lake Huron, the Ontario Ministry of Natural Resources conducted an intensive study of near-shore fish populations and cormorant populations in Georgian Bay and North Channel of Lake Huron from 2000-2005 (Ridgway et al. 2006*a, b*). Data from these studies indicated there were negative relationships between nearshore fish biomass and fish consumption by nesting cormorants with cormorant nest density explaining 36% of the variability in fish populations in Georgian Bay and 49% of the variability in the North Channel (Casselman and Marcogliese 2006). In some study areas and years, (40%-60%; N = 40), particularly in Georgian Bay, estimates of annual fish consumption by DCCOs greatly exceeded annual nearshore fish production. The study also provided evidence that the management technique of egg oiling resulted in decreased fish consumption and increased nearshore fish species and biomass.

Les Cheneaux Islands (LCI), Lake Huron

The EA specifically addressed the need for action in the LCI area (including Crow Island, Goose Island, Green Island, St. Martins Shoal, and Little Saddlebag Island in Mackinac and Chippewa Counties). The CDM strategy used at LCI includes the use of egg-oiling and the removal of adult birds by shooting to reduce the total DCCO foraging pressure on the site. In 2004 and 2005, 14% and 23.1% of the breeding DCCOs were removed respectively under the PRDO. When comparing aerial surveys of the LCI from 2003 to the management years of 2004 and 2005, there appeared to be fewer foraging DCCOs in the LCI (Figure 1) after CDM was initiated.

The yellow perch fishery and population has been depressed in the Les Cheneaux Islands since at least the year 2000. Beginning in October 2004, shortly after the first season of cormorant control, the Michigan Department of Natural Resources (MDNR) detected a statistically significant increase in yellow perch catch-per-unit-effort (CPUE) in survey gear (gillnets), indicating an increase in perch abundance. The majority of the fish were two-year-old fish from the 2002 year class indicating that the perch population is rebuilding. In 2005 the gillnet CPUE remained at the higher 2004 level but did not increase further. The increases were seen in all sample locations within the LCI in 2004, but were mainly occurred in Musky Bay which is a primary area for perch production. Similarly, the 2005 sport fishery also improved considerably as indicated by the MDNR annual creel survey. Other evidence of recovery includes a slowly increasing mean age of the perch in the population. Not seen yet is any slowing in perch growth, which would be another

sign of increasing perch density. Also, it's too early to calculate total annual mortality estimates from these new, stronger year classes. Declines in total annual mortality rate will be one of the principal means with which to test for effects of the reductions in DCCO numbers.

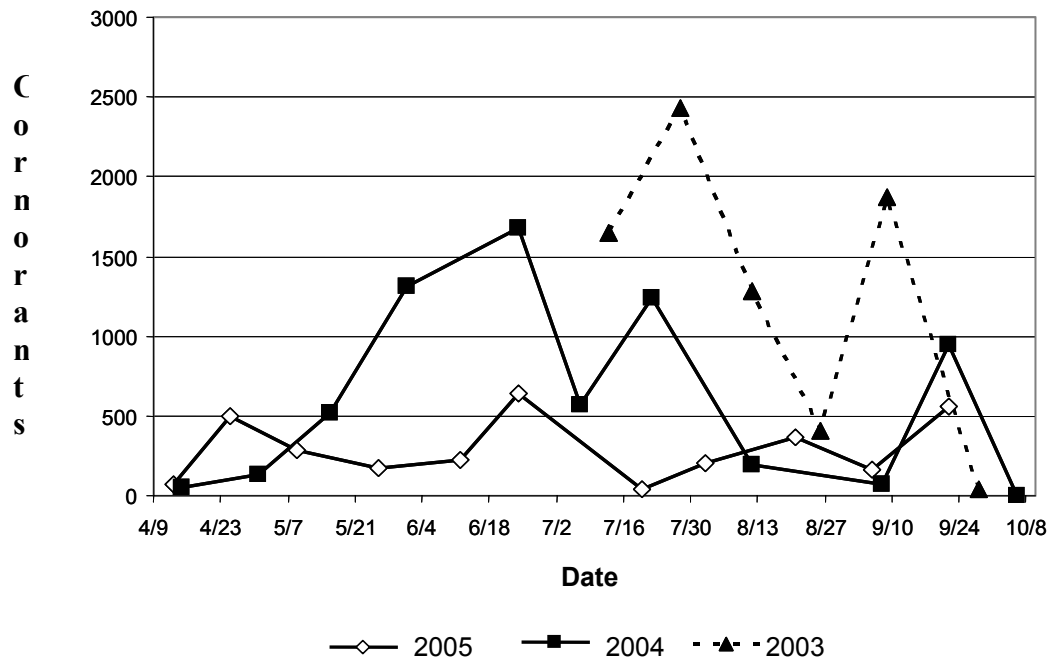


Figure 1. Number of birds seen foraging in Les Cheneaux Islands during aerial surveys. Cormorant damage management activities were initiated in 2004.

Overall, the initial changes in the LCI are positive signs for the perch population and fishery and are consistent with the expected benefits of CDM, although it is too early to determine exactly what impact CDM is having. Evaluation of the impacts of CDM on perch in the LCI area is complicated by the general improvements in the perch fishery which have been observed in other areas of Lakes Michigan and Huron in recent years, including areas which have not undergone CDM. Most of those improvements outside of the LCI, however, stemmed from the 2003 perch year class. Production of perch in the LCI was also greater in 2003, however, the initial increase there began with the 2002 year class (which has not been associated with perch recovery in other locales). Because year class strength is first assessed at the age-2 level in the LCI, it is possible that these year classes are showing stronger because of less predation during the first years of life. Regardless, recent stronger perch year classes will provide opportunities to further test for the effects of CDM efforts. Current predictions are that at least another year or two of CDM will be necessary to make a first determination. In the meantime, perch populations are moving in the right direction and there are early positive indications regarding the efficacy of CDM to benefit perch populations.

New Locations for CDM to Protect Public Resources

The following is a list of new areas where WS has been requested to provide assistance with CDM. Problems with DCCOs at these sites are not necessarily new but rather DCCOs have been at these sites in large numbers for some time and WS is now able to respond to these sites because of available funding. Damage management activities in most of these areas will be similar to that conducted at LCI. However, in some places, DCCOs primarily nest in trees making effective egg oiling difficult and/or impossible. Local population reduction efforts at these sites are usually limited to shooting. However, repeated site visits for CDM and/or research tend to make DCCOs wary and may cause DCCOs to abandon the island, making them less vulnerable to shooting. Too many visits to a site may also result in unacceptable levels of disruption to co-nesting species. If this occurs shooting may be delayed to post-nesting when DCCOs can be shot when lured to decoys.

1.1.1 Thunder Bay, Lake Huron

The first new location includes the DCCO colonies in Thunder Bay in Alpena County. Thunder Bay is recognized to be one of the leading spawning and nursery areas of whitefish in Lake Huron (Ebener et al. 2004). The Thunder Bay area is also one of the most productive fishing grounds for lake whitefish in the Great Lakes. Native American and State-licensed commercial fisheries harvest in the range of 1.5 to 1.8 million pounds of lake whitefish annually from Lake Huron offshore of the Thunder Bay area. Whitefish are vulnerable to DCCO foraging during the first two years of their life when juveniles spend time in shallow water where they are accessible to foraging DCCOs. MDNR has observed marked declines in young whitefish in the trawl catches from Thunder Bay in recent years (J. Johnson, MDNR, pers. comm.). The trawl surveys also indicate declines in catch rates of all fish species caught in Thunder Bay (Figure 2). Estimated standing crop of bottom-oriented (vulnerable to a bottom trawl) fish in Thunder Bay was only 0.13 pounds per acre in 2005. A principal component of the trawl catch has been juvenile lake whitefish. Reasons for the sharp decline in recent years are unclear. However, similar but less pronounced trends have also been observed in U.S. Geological Survey trawl samples from other near-shore areas of Lake Huron, so some of the change may be a response to the impacts of introduced zebra and quagga mussels. The mussels have changed the food chain by locking the nutrients in the bottom of the lake, which has resulted in reductions in zooplankton and small fish including forage fish and juvenile whitefish which feed on zooplankton. Data indicate that plankton productivity may be down to approximately 1/3 of customary levels. If this is true, availability of prey fish for piscivorous fish and waterfowl has declined, which in turn appears to have increased competition among predators for the diminishing prey supply. Chinook salmon and lake trout, for example, have exhibited sharply reduced growth rates since alewife, until recently the chief prey fish for both species, collapsed in 2003. Presumably DCCOs are similarly coping with reduced prey availability, which complicates the question of what DCCOs are eating and how they are competing with other piscivorous animals in Lake Huron.

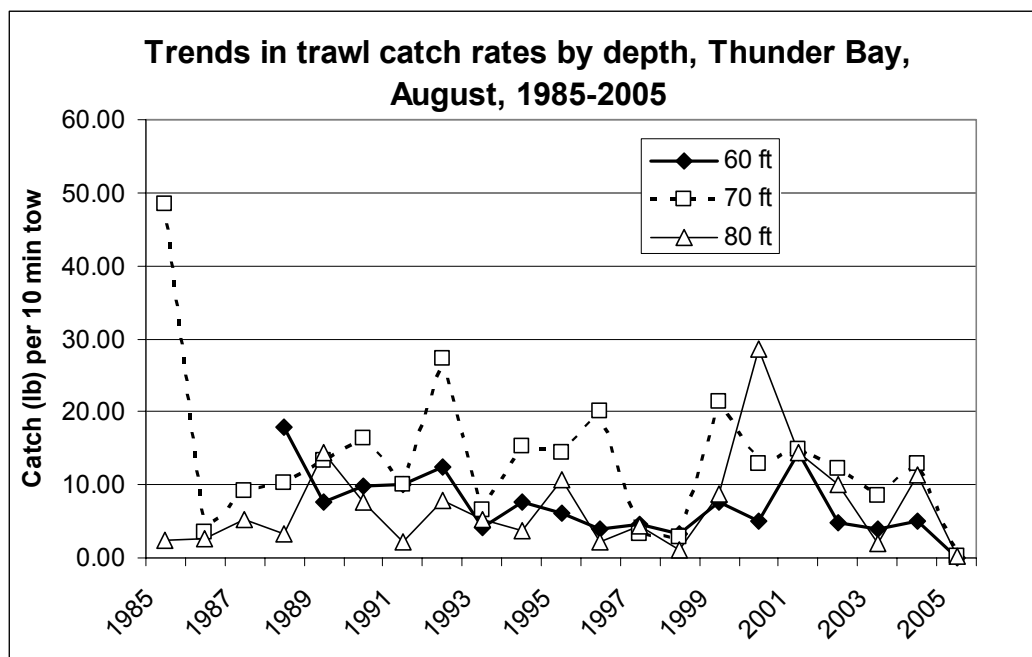


Figure 2. Trawl catch rates for fish in Thunder Bay, Lake Huron, MI.

During the 1980s and early 1990s, Thunder Bay was one of Lake Huron's most important put-grow-take brown trout fisheries. The annual Alpena Brown Trout Festival was inspired by this brown trout fishery. Brown trout numbers and harvest declined sharply during the 1990s and the fishery collapsed after 1995. Rising predation, principally by cormorants, on recently stocked brown trout is believed to have been a leading cause of the collapse of this fishery (Johnson and Rakoczy 2004). Walleye can also forage on juvenile brown trout, however, walleye numbers in the Bay have been stable since before the brown trout collapse. Newly released brown trout may remain in near-shore shallow water areas for a period of weeks after release, making them particularly vulnerable to DCCO predation. Other fish species popular with recreational fishers in Thunder Bay include walleye, yellow perch and smallmouth bass. Yellow perch harvest has been near zero since the early 1990s. The status of the bay's smallmouth bass population is not well known.

The DCCO population in the Thunder Bay archipelago grew from an estimated 452 to 3,702 nesting pairs (Gull, Scarecrow, Bird and Grass Islands) between 1989 and 2005. Assuming 1 non-breeding bird per nest (lower end of range from Wires et al. (2001)), a total of 11,106 adult and non-breeding cormorants resided in Thunder Bay in 2005. At 1 pound of consumption per bird per day (Wires et al. 2001), cormorants in Thunder Bay consumed approximately 1,110,400 pounds of fish in 2005. If all DCCO feeding was in Thunder Bay, consumption would have been at a rate of 34 pounds per acre, which far exceeds the trawl-based standing crop (instantaneous total fish biomass) of bottom oriented fish in Thunder Bay in recent years. Not all DCCO foraging occurs in Thunder Bay, but these calculations do provide an indication of the potential impacts of DCCO foraging on the fishery resources in the Bay.

Lakewide, DCCOs consumed an estimated 30.6 million pounds of fish in Lake Huron during the late 1990s, accounting for approximately 18% of the total lake wide consumption demand by predators (Dobiesz 2004). The alewife population of Lake Huron, including Thunder Bay collapsed in 2003 due to foodweb changes and rising predation rates (Schaeffer et al. 2006).

One of the primary concerns relating to DCCO foraging in Thunder Bay pertains to the overall decline in fish species, alewives in particular. This decline is attributable to a number of factors including mussels as discussed above. Cormorants are opportunistic foragers, and in the absence of alewives, DCCO foraging will shift to other species, including species with high recreational and commercial value. There is also concern that the continued presence of high DCCO densities, despite declining fish populations in the Bay, may lead to adverse community-level effects on the fishery because of the proportion of fish biomass that may be removed.

The MDNR is conducting intensive monitoring efforts for the fish population in Thunder Bay including an ongoing creel survey in the Thunder Bay area to directly assess impacts on angling trends, annual assessments and monitoring of the commercial fish catch in Thunder Bay including the trawl assessment, and an annual gillnet sets and electrofishing survey conducted in conjunction with the USFWS Alpena Field Office. MDNR will also assess response of the fish population by examining cormorant stomachs every few years, beginning this year. Given that DCCOs are opportunistic foragers, if the fish population recovers MDNR anticipates see higher proportions of species other than crayfish and gobies in the cormorant's stomachs.

The colonies in this area which might receive CDM include Gull Island, Grassy Island, and Bird Island, which are owned by the Michigan Nature Association, and Scarecrow Island, which is part of Michigan Islands National Wildlife Refuge and is managed by the Shiawassee National Wildlife Refuge. However, refuge biologists do not believe that current fishery data warrants CDM on the refuge at this time. There is also some evidence that the DCCO population on the refuge may be declining in the absence of CDM. Cormorant damage management will not be conducted on the refuge or on Michigan Nature Association lands in 2006 although some shooting may be conducted at other sites in the bay. As stated above, MDNR is very concerned about the health of the fishery in the Bay and, depending on trends in DCCO populations and available data, and landowner/manager permission CDM could be conducted at these sites in future years.

1.1.2 Big and Little Bays de Noc, Lake Michigan

The second new location involves colonies in Big and Little Bays De Noc in Delta County. Nesting data compiled by the MDNR for 2005 indicated a total of 6,813 nests in three colonies in the area (MDNR unpublished data, Weseloh et al. 2006). This is consistent with aerial surveys by WS in 2005 that estimated at least 10,000 nesting birds from five colonies. Peak numbers of birds were documented by these flights in late July after fledging with approximately 27,000 DCCOs (non-breeders and breeders combined) in this vicinity. The MDNR and members of the public are concerned about the sustainability of fish populations in this area.

In a preliminary analysis performed by the MDNR using the methods of Ridgway et al. (in press 1 & 2) from Ontario, it was estimated that DCCO consumption exceeded the estimated annual production of fish biomass in Bays de Noc (D. Fielder, MDNR, personal communication). This is done by expressing DCCO annual consumption on a per hectare basis and contrasting that rate with the local total standing biomass and the estimated annual harvestable surplus that stems from that biomass. The exercise made use of the nest numbers identified above and utilized the consumption rates for different life stages and months reported by Seelfelt (2005). The available foraging area made use of the consumption area formula used by Ridgway (1 & 2) which creates a circle or halo based on nest numbers. The available foraging area was reduced within that halo by the area limited to a depth of 20 m or less (Ridgway 1 & 2). This was derived from bathymetry data in a geographic information system (GIS). There were no standing biomass values for the Bays de Noc area to draw upon so the analysis utilized a standard value of 30 kg/ha which is consistent with the measured values of the North Channel region of Lake Huron. It was further estimated that 12.5% of the annual total biomass equated to total annual production. This value of 3.75 Kg/ha was then used to represent 100% of total annual production and was the value used to compare DCCO consumption demand. The 2005 consumption demand in the Bays de Noc area was estimated to be 15.48 Kg/ha meaning that not only were cormorants utilizing 100% of the total annual production of the fish community, but that they were likely also diminishing the standing biomass crop resulting in an unsustainable situation. The analysis is preliminary and could be refined with measured biomass levels from the local environment. The exercise, however, is sufficient to raise concerns and the outcome is consistent with the findings of the Ontario work.

In the Bay de Noc situation the concern is for the overall impacts on the fish community as opposed to any one fish species. Increasingly, DCCO consumption of fish resources is being viewed as an issue of allocation. Although species specific issues are not fully understood in the Bays de Noc area, the MDNR is interested in seeing CDM applied to this area in an effort to benefit the overall fish community by freeing fish resources to supply the consumption needs of other predators (walleye and smallmouth bass, salmon, lake trout) as well as the local fisheries (walleye, yellow perch, smallmouth bass).

The colonies in this area which may receive CDM include Round Island and Snake Island, both of which are State owned.

1.1.3 Beaver Islands Archipelago

The Beaver Islands archipelago remains one of the largest concentrations of DCCOs in the Great Lakes. Nest count summaries compiled by the MDNR in 2005 indicates that 11,071 DCCO nests exist in the area (MDNR unpublished data, Weseloh et al. 2006). Although some of the smaller local rookeries were found abandoned in 2005, the overall nest density remains high there. A popular smallmouth bass sport fishery in the area started declining in the early 1990s. Smallmouth bass are particularly vulnerable to DCCO predation because they spend their lives in shallow water habitats accessible to DCCOs and because of their tendency to guard their nests. DCCO foraging can impact bass directly by removing individuals (Lantry et al. 2003) and indirectly through removal or injury of breeding adults. DCCO foraging may impact bass indirectly by reducing recruitment because breeding adults are not guarding their eggs while fending off cormorants or if injured by cormorant attacks. Seider (2003) assessed the local bass population during

1999-2002. Based on concurrent declines in non-game fish, high survival rates for adult fish (fish age 6 and older) and the current low level of angler effort and harvest of smallmouth bass in the area, Seider concluded that angler harvest was not currently limiting the smallmouth bass population. Growth rates and condition of the fish were high indicating that food supplies were not limiting the population. There was evidence of unusually high mortality rates for smallmouth bass ages 3-5 (50-99%). Michigan angling regulations set a minimum length limit of 350mm for smallmouth bass in the area, a size obtained at age 6-7, so angling is unlikely to be the cause of the high mortality rate. Predation by other fish could have caused the unusually high juvenile mortality rates but few predatory fish (northern pike (*Esox lucius*) or bowfin (*Amia calva*) were captured during survey efforts.

The fish in the age classes with the high mortality rates were approximately 150-300 mm in length. Previous studies have shown that fish in this size range are readily taken by DCCOs (Craven and Lev 1987, Hobson et al. 1989, Campo et al. 1993, Modde et al. 1996, Neuman et al. 1997, Adams et al. 1999, Johnson et al. 2002). Based on the presence of crayfish in the diet of DCCOs from the area, Seider (2003) concluded that DCCOs are foraging in shallow-water habitats where smallmouth bass are found. However, in 2001 only 1 smallmouth bass was found in the stomachs of 50 DCCOs that were taken for a diet study. (J Gillingham, Central Michigan University, pers. com. used in Seider (2003)). Seider (2003) noted that, because the small smallmouth bass population is extremely low (approximately 2,000 fish) and the DCCO population in the area is high (approximately 6,657 breeding pairs plus non-breeding birds in 2001; Seefelt 2005), even an extremely low occurrence of smallmouth bass in DCCO diets could have a detrimental impact on the bass population. For example, if the number of non-breeding DCCOs is estimated at 0.6 individuals per breeding pair (Tyson et al. 1999), then the total DCCO population in the area could be estimated at approximately 17,300 DCCOs. At this level, if only 12% of the DCCOs ate only 1 bass during the entire summer, DCCO bass consumption would be approximately equal to Seider's (2003) estimate of 2,000 bass in his Beaver Island study area. Seider (2003) concluded that a mortality problem that was consistent with high predation by DCCO was likely preventing/slowing the recovery of the smallmouth bass population.

A later study by Seelfelt (2005) evaluated population size, diets and foraging behavior of DCCOs in the Beaver Archipelago from 2000-2004. Only 1 smallmouth bass was found in the 150 DCCO stomachs and 978 regurgitate samples examined. Alewife (55.5%), crayfish (18.8%), sucker (11.9%) and sculpin (5.5%) comprised the majority of biomass in DCCO diet samples in 2000. In 2001, alewife (77.1%), sucker (9.8%) and sculpin (6.1%) comprised the majority of biomass in DCCO diet samples. Seelfelt used telemetry data from 10 DCCOs and observations of rafts of DCCOs to conclude that DCCOs from Pismire and the Southeast Garden colonies spent relatively little time in areas identified by Seider (2003) as having historically supported good smallmouth bass fisheries. However, her data do show some observations of rafts in and near St James Harbor on Beaver Island. Data from models indicated that DCCO predation contributed to the decline of smallmouth bass in the area, but the models also projected eventual recovery of bass in the absence of CDM providing the sport fishing mortality remained zero or very low. However there are concerns that the assumptions in the model regarding fish mortality rates may not accurately represent what may happen if the bass population starts to recover. DCCOs are opportunistic feeders and bass mortality to DCCO foraging may

increase if the bass population increases and may not remain a constant portion of the population. Similarly fishing pressure may also increase as the population increases.

Central Michigan University, in cooperation with the MDNR, has planned further smallmouth bass work in the Beaver Islands in 2006. CDM action has been deferred for this year. However, the area remains a substantial source of DCCOs for Lake Michigan and continues to be a priority candidate for CDM by many citizens and public officials. Cormorant damage management activities may be conducted in this area in future years.

Determining the exact nature and magnitude of the impact of DCCOs on fish populations is difficult, especially in the complex systems in the Great Lakes (Rudstam et al. 2004). In Michigan, study of the issue is further complicated by the fact that in some areas, like Thunder Bay and the Beaver Archipelago, where the majority of the decline in the fishery occurred before the initiation of studies on local fish populations and the impacts of DCCO foraging. In light of recent research, there is also a growing agreement among fisheries biologists that DCCO impacts need to be considered not just in terms of sport fish populations, but in terms of impacts on the overall fish community including species sought by the commercial fishery and non-game and forage species. DCCO fish consumption is beginning to be viewed more from an allocation perspective. In situations where there is evidence that cormorants consume as much as (and in some cases in excess of) 100% of the annual production of fish biomass in local environments, this threatens sustainability of many species either through direct predation or competition. From a production perspective, it leaves nothing allocated to other predators or to fisheries without exceeding sustainability.

Although managers often do not have the benefit of long term data series for every location where CDM is a concern, it is clear, however, that high numbers of DCCOs have the potential to adversely impact local fisheries. The existing and proposed programs to address concerns regarding DCCO impacts on fishery resources use an adaptive management approach to address this issue. The adaptive management approach involves incremental reductions in DCCO numbers in local areas coupled with concurrent monitoring of DCCO and fish populations. Reductions in DCCO numbers are set and carefully monitored to ensure that the actions do not threaten the viability of the State DCCO population. This type of approach strives to allow for management benefits while simultaneously learning from the experience to better define the full scale and scope of the problem and the extent of benefits to be expected from CDM. This approach provides for realizing management benefits, facilitates research and evaluation without having to fully eliminate all uncertainty in all locations.

1.2 Need for CDM to Protect Wildlife and Native Vegetation, Including Threatened and Endangered Species

The EA and FEIS (USFWS 2003) discuss the potential for high numbers of cormorants to have an adverse impact on vegetation, primarily through effects associated with accumulation of guano. Subsequent information from other locations also documents that high numbers of DCCOs do have an adverse impact on vegetation (USDA 2006, Hebert et al. 2005). For years, cormorants have nested on the shipwreck *Morazan* near South Manitou Island (SMI) within the Sleeping Bear Dunes National Lakeshore in Leelenau County. Fifty to 150 nesting pairs of DCCOs have used the island as a nest site in the recent past and SMI currently has 3 to 5 acres of vegetation that have died due to impacts associated with nesting cormorants. On a small scale this is a natural phenomenon which also occurs at gull, great-blue heron, and other waterbird rookeries. However,

if DCCO numbers continue to increase, they have the potential to impact and alter large areas of the island including the mature white cedars (*Thuja occidentalis*) on the island. In addition to observed increases in DCCO populations reported here and in the EA, increased pressure on the SMI may result from cormorants displaced by CDM programs conducted elsewhere in Michigan and the Great Lakes. The NPS considers the ancient cedars in the Valley of the Giants to be a distinctive and valuable plant community and has requested help in protecting the site.

The agencies proposed to remove nests and eggs from live trees in the perimeter of the area on the island that is currently used by nesting DCCOs to prevent expansion of the DCCO population into areas where vegetation has not been lost. It is anticipated that around 40 nests and eggs will be removed in 2006 (25% of 150 nests). Approximately 100 nesting pairs will be allowed to breed and raise their young each year at SMI. Both lethal and non-lethal controls will be used to maintain the breeding population at this level and to discourage nesting by new birds.

II. SCOPE

2.1 AFFECTED ENVIRONMENT

The purpose of this EA is to analyze the effects of WS activities in Michigan to manage damage and conflicts involving double-crested cormorants. As noted in USDA (2004), WS, the MDNR and the Tribes can take action to manage DCCO damage under the Public Resource Depredation Order (PRDO; 50 CFR 21.48) and through depredation permits issued by the USFWS. WS can also assist others in obtaining depredation permits. WS and other entities can also take DCCOs under scientific collecting permits issued by the USFWS. The proposed action could include areas in and around public and private facilities and properties where cormorants may roost, loaf, feed, nest or otherwise occur. Examples of areas where cormorant damage management activities could be conducted include, but are not necessarily limited to: aquaculture facilities; fish hatcheries; lakes; ponds; rivers; swamps; marshes; islands; communally-owned homeowner/property owner association properties; boat marinas; natural areas; wildlife refuges; wildlife management areas; and airports and surrounding areas. The proposed action may be conducted on properties held in private, local, State, Federal or Tribal ownership. WS may, with landowner permission, conduct breeding bird control activities in any of the 48 breeding sites currently identified in Michigan (USDI 2001). This would include the Les Cheneaux Islands region of Lake Huron and possibly other nesting locations identified by Wires and Cuthbert (2001) as high priority for the conservation of colonial waterbirds in the U.S. Great Lakes. WS will consult the USFWS before undertaking cormorant control activities at the high-priority sites. Of these 48 breeding sites, 19 have been identified to occur on publicly owned land. WS will acquire the necessary landowner permission prior to conducting CDM activities.

The scope of this EA is limited to the CDM actions of WS and agencies working cooperatively with WS. Although the EA provides estimates of the anticipated activities of other entities (e.g., tribes) for the purpose of analyzing cumulative impacts, these estimates do not represent a commitment by these entities to work within the parameters analyzed by WS. WS and the USFWS will conduct annual monitoring of actions taken under the PRDO with assistance from cooperating agencies to determine if impacts are within parameters predicted and analyzed in the EA. The EA will be updated as needed pursuant to the National Environmental Policy Act (NEPA).

2.2 Period for Which the Amended EA is Valid

If it is determined that an EIS is not needed, the amended EA would remain valid until WS, the USFWS, the NPS and other appropriate agencies determine that new needs for action, changed conditions, and/or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document would be amended pursuant to NEPA. Review of the EA would be conducted each year to determine if impacts are within parameters analyzed and if there are new issues or alternatives which warrant additional analysis.

2.3 Site Specificity

This EA analyzes potential effects of WS' CDM activities that could occur at private and public property sites or facilities within Michigan. It also addresses the impacts of CDM in areas where additional agreements may be signed in the future. Because the proposed action is to reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional CDM efforts could occur. Thus, this EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program.

Planning for the management of cormorant damage must be viewed as being conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, insurance companies, etc. Although some of the sites where cormorant damage will occur can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted.

The EA emphasizes important issues as they relate to specific areas whenever possible. However, the issues that pertain to the various types of cormorant damage and resulting management are the same, for the most part, wherever they occur, and are treated as such. The standard WS Decision Model (Slate et al. 1992) and WS Directive 2.105 is the routine thought process that is the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by WS in the State (See USDA (1997) and Chapter 2 for a more complete description of the WS Decision Model as well as examples of its application). Decisions made using this thought process will be in accordance with any mitigation measures and standard operating procedures described herein and adopted or established as part of the decision.

The analyses in this EA are intended to apply to any action that may occur *in any locale* and at *any time* and by any agent (e.g. USFWS, MDNR, or tribal personnel) acting under the authority and guidance of WS within Michigan. In this way, APHIS-WS and USFWS believe they meet the intent of NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with NEPA and still be able to accomplish its mission.

2.4 Summary of Public Involvement

The pre-decisional EA was prepared and released to the public for a 31-day comment on April 4, 2004. A notice of availability of pre-decisional EA period was published in *The Detroit News* and the *Detroit Free Press* and was also mailed directly to agencies, organizations, and individuals with probable interest in the proposed program. The USFWS Region 3 office placed a notice of availability of the pre-decisional EA on their website

(<http://midwest.fws.gov/midwest/MICormorantNEPA>). A total of 15 comment letters were received by WS within the comment period, ten (10) supporting the proposed action and five (5) opposed. All comments were analyzed to identify substantial new issues, alternatives, or to redirect the program. Wildlife Services responses to specific comments are included in Chapter 6 of the EA. All letters and comments are maintained at the Wildlife Services State Office in Okemos, Michigan.

Similarly, this amendment will be made available to the public for a comment period beginning on June 16, 2006 and ending on July 19, 2006. A notice of availability of pre-decisional EA period will be published in *The Detroit News* and the *Detroit Free Press* and will also be mailed directly to agencies, organizations, and individuals with probable interest in the amendment, including those agencies and individuals who commented on the original EA. The USFWS Region 3 office will also place notice of availability of this amendment on their website (<http://www.fws.gov/midwest/MICormorantNEPA>).

III. AUTHORITY OF FEDERAL AND STATE AGENCIES IN CORMORANT DAMAGE MANAGEMENT IN MICHIGAN

3.1 United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services.

Wildlife Services is the Federal program authorized by law to reduce damage caused by wildlife. The primary statutory authorities for the Wildlife Services program are the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c). Wildlife damage management is the alleviation of damage or other problems caused by or related to the presence of wildlife, and is recognized as an integral part of wildlife management (The Wildlife Society 1992). WS uses an IWDWM approach, commonly known as Integrated Pest Management (WS Directive 2.105) in which a combination of methods may be used or recommended to reduce damage. WS wildlife damage management is not based on punishing offending animals but as one means of reducing damage and is used as part of the WS Decision Model (Slate et al. 1992, USDA 1997, WS Directive 2.201). All WS wildlife damage management activities are conducted in compliance with relevant laws, regulations, policies, orders and procedures, including the Endangered Species Act of 1973.

3.2 United States Department of the Interior, Fish and Wildlife Service (USFWS)

The primary responsibility of the USFWS is fish, wildlife, and plant conservation. While some of the USFWS' responsibilities are shared with other Federal, State, Tribal, and local agencies, the USFWS has special authorities in managing the National Wildlife Refuge System; conserving migratory birds, endangered species, certain marine mammals, and nationally significant fisheries; and enforcing Federal wildlife laws. The Migratory Bird Treaty Act (MBTA) gives the USFWS primary statutory authority to manage migratory bird populations in the U.S. The USFWS is also charged with implementation and enforcement of the Endangered Species Act of 1973, as amended and with developing recovery plans for listed species.

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present

and future generations of Americans. One unit of the Refuge System in Michigan is Michigan Islands National Wildlife Refuge. This refuge was established under Executive Order 9337 in 1943 as a refuge and breeding ground for migratory birds and other wildlife. The refuge is comprised of eight islands in Lakes Michigan and Huron, including Gull, Pismire, Hat and Shoe Islands in northern Lake Michigan, Thunder Bay and Scarecrow Islands in Thunder Bay, and Big and Little Charity islands in Saginaw Bay. Scarecrow, Pismire, and Shoe islands were officially designated as Federal wilderness areas in 1970. Cormorants nest at Little Charity, Scarecrow, Gull, and Hat Islands.

3.3 United States Department of the Interior, National Park Service (NPS)

The NPS is responsible for management of Sleeping Bear Dunes National Lakeshore, including South Manitou Island, the Morazon shipwreck and the North Manitou Island Shoals Coast Guard Lighthouse, all of which host nesting DCCOs.

The Organic Act creating the NPS states the agency will “conserve the scenery and the natural and historic objects and the wildlife therein and... provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (16 U.S.C. 1).

The Management Policies 2001 for the NPS state in Section 4.4.2, Management of Native Plants and Animals, “Whenever possible, natural processes will be relied upon to maintain native plant and animal species, and to influence natural fluctuations in populations of these species. The NPS may intervene to manage individuals or populations of native species only when such intervention will not cause unacceptable impacts to the populations of the species...and when at least one of the following conditions exists:

Management is necessary

- Because a population occurs in an unnaturally high or low concentration as a result of human influences ...and it is not possible to mitigate the effects of the human influences;
- To protect rare, threatened, or endangered species; etc.

3.4 Michigan Department of Natural Resources (MDNR).

The Michigan Department of Natural Resources authority in wildlife management is given under Article I, Part 5, Regulation 324.503 of Michigan Public Act 451 of 1994. This section states in part;

The department shall protect and conserve the natural resources of this state; provide and develop facilities for outdoor recreation; prevent the destruction of timber and other forest growth by fire or otherwise promote the reforestation of forest lands belonging to the state; prevent and guard against the pollution of lakes and streams within the state and enforce all laws provided for that purpose with all authority granted by law; and foster and encourage the protecting and propagation of game and fish.

MDNR currently has a Memorandum of Understanding with WS. The document establishes a cooperative relationship between WS and MDNR. Responsibilities include planning, coordinating, and implementing policies to address wildlife damage management and facilitating exchange of information.

IV. ALTERNATIVES

Five alternatives were developed in the EA to respond to conflicts with DCCOs and DCCO damage. The PRDO has been implemented in the state since the completion of the EA in 2004, so Alternative 1 has become the Current Action/No Action Alternative. Alternative 6, Expanded Integrated CDM Program has been added. The following is a summary of the Alternatives. A detailed discussion of the alternatives is provided in the EA. Three additional alternatives that were considered but not analyzed in detail and are also addressed in the EA.

Alternative 1. Integrated CDM Program, including implementation of the Public Resource Depredation Order (Current Action/No Action Alternative). WS and the USFWS propose to implement a CDM program in Michigan, including the implementation of the PRDO (50 CFR 21.48) as promulgated by the USFWS. An Integrated Wildlife Damage Management approach would be implemented to reduce cormorant damage and conflicts to aquaculture, property, natural resources, and human health and safety. Damage management would be conducted on public and private property in Michigan when the resource owner (property owner) or manager requests WS assistance. An IWDM strategy would be recommended and used, encompassing practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, physical exclusion, empty nest destruction, habitat modification, or harassment would be recommended and utilized to reduce damage. In other situations, birds would be humanely removed through use of shooting, egg oiling/destruction, or euthanasia following live capture. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or there could be instances where the application of lethal methods alone would be the most appropriate strategy. Wildlife damage management activities would be conducted in the State, when requested and funded, on private or public property, after an *Agreement for Control* or other comparable document has been completed. WS will acquire the necessary landowner permission prior to conducting CDM activities. All management activities would comply with appropriate Federal, State, and local laws, including applicable laws and regulations authorizing take of double-crested cormorants, and their nests and eggs. The USFWS would be responsible for ensuring compliance with the PRDO regulations at 50 CFR 21.48, issuing migratory bird permits, and ensuring that the long-term sustainability of regional cormorant populations is not threatened.

Alternative 2. Non-lethal CDM Only By WS. Under this alternative, WS would be restricted to implementing or recommending only non-lethal methods in providing assistance with cormorant damage problems. Entities requesting CDM assistance for damage concerns would only be provided information on non-lethal methods such as physical exclusion, habitat modification, empty nest destruction, or harassment. However, it is possible that persons receiving WS' non-lethal technical and direct control assistance could still resort to lethal methods that were available to them. Information on lethal CDM methods would not be available from WS but would still be available to through sources such as USDA Agricultural Extension Service offices, USFWS, MDNR, universities, or pest control organizations. However, WS' participation in the consultations needed for the USFWS to issue depredation permits would be prohibited under this alternative, so the USFWS would not issue depredation permits for CDM.

Alternative 3. Technical Assistance Only. This alternative would not allow for WS operational CDM in Michigan. WS would only provide technical assistance and make recommendations when requested. Aquaculture producers, property owners, agency personnel, or others could conduct CDM using any non-lethal or lethal method that is legally available to them. WS would not take part in the implementation of the PRDO. WS could conduct the consultations required by the USFWS for the issuance of depredation permits, so lethal CDM methods could be used by entities other than WS.

Alternative 4. No WS CDM. This alternative would eliminate WS involvement in CDM in Michigan. WS would not provide direct operational or technical assistance and requesters of WS services would have to conduct their own CDM without WS input. Information on CDM methods would still be available through other sources such as USDA Agricultural Extension Service offices, USFWS, MDNR, universities, or pest control organizations. Wildlife Service's participation in the consultations needed for the USFWS to issue depredation permits would be prohibited under this alternative, so the USFWS would not issue depredation permits for CDM.

Alternative 5. Integrated CDM Program, excluding WS implementation of the PRDO. This alternative would be similar to Alternative 1, with the exception that WS will not take part in the implementation of the PRDO. More specifically, WS would not kill DCCOs or conduct egg oiling/destruction to protect public resources (fish, wildlife, plants, and their habitats) on private and public lands and freshwaters under the authority provided to WS by 50 CFR 21.48. The MDNR and Tribes would be able to implement the PRDO; and the USFWS would continue to issue migratory bird permits to take DCCOs and their eggs. An Integrated Wildlife Damage Management approach would be implemented to reduce cormorant damage and conflicts to aquaculture, property, natural resources, and human health and safety. Damage management would be conducted on public and private property in Michigan when the resource owner (property owner) or manager requests WS assistance including the use of lethal and non-lethal methods. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). On South Manitou Island where the purpose of the proposed action is to protect the ancient cedars at Valley of the Giants, it may be possible for WS or the NPS to obtain and work under a Migratory Bird Depredation Permit or the NPS may be able to request assistance under the PRDO from the State or Tribes².

Alternative 6. Expanded Integrated CDM

This alternative is identical to Alternative 1 except that combined annual DCCO take of all action agencies under the PRDO could be as high as 9,700 DCCOs per year. Total cumulative DCCO take for all causes could be up to 10,500 DCCOs per year. In addition to sites where WS has worked since 2004, sites where WS would conduct CDM under the PRDO in the future could include, but are not limited to, DCCO colonies in Thunder Bay in Alpena County, Big and Little Bays De Noc in Delta County and South Manitou Island within the Sleeping Bear Dunes National Lakeshore in Leelenau County.

V. ISSUES

The EA describes the alternatives considered and evaluated using the identified issues. The following

² The PRDO limits tribal authority as an action agency to tribal lands and, where applicable and where landowner approval is obtained, to lands within the ceded territories. On all other land classes, tribes would have to work as agents of WS or the MDNR.

issues were identified as important to the scope of the analysis (40 CFR 1508.25). The impact of Alternative 6 on each of these issues is analyzed below

- Effects on double-crested cormorants
- Effects on other wildlife species, including T&E species
- Effects on human health and safety
- Effects on aesthetic values
- Humaneness and animal welfare concerns of methods used

5.1 Effects on Double-crested Cormorants

As stated above, determining the impacts of DCCO foraging on fish populations is difficult and it can take years to get conclusive results. The existing and proposed programs to address concerns regarding DCCO impacts on fishery resources use an adaptive management approach to address this issue. The adaptive management approach involves reductions in DCCO numbers in local areas coupled with concurrent monitoring of fish populations. Proposals for 2006 include a 50% reduction in the number of adult birds in the Les Cheneaux Islands, and 33% reductions in the number of breeding birds at Thunder Bay and Big and Little Bays du Noc. In projects to protect free-swimming fish populations, DCCO numbers in any specific area would not be reduced below the level they were at when fishery declines started to occur and, it is anticipated that improvement in the fishery would be seen before DCCOs are reduced to that level. For example, declines in the fishery at Thunder Bay were detected in the early 1990s so the 1989 population level would be the minimum level for that population. Local DCCO removals would not eliminate all nesting DCCOs from any colony and a minimum density of 100 pair would be allowed to remain at any given colony where CDM is conducted.

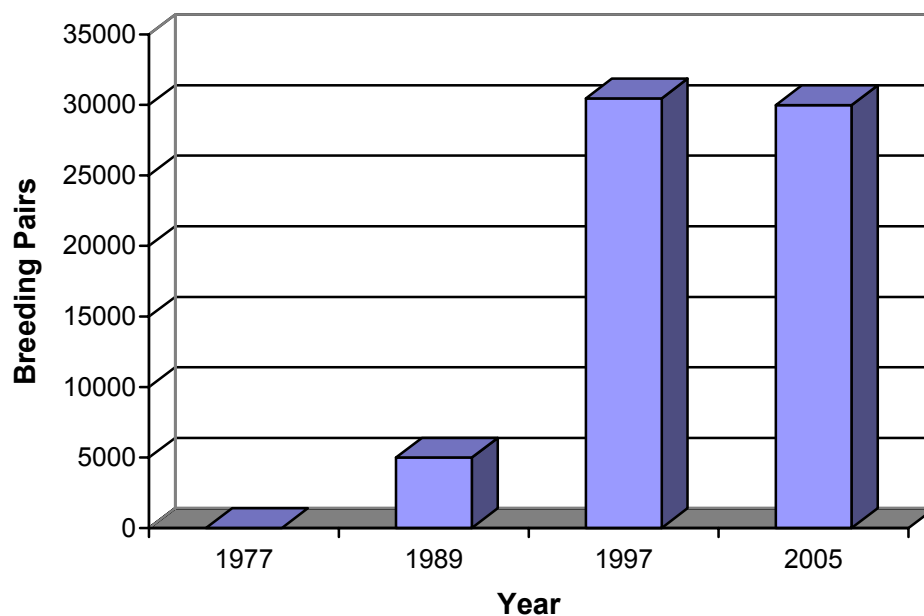


Figure 3. Breeding pairs of DCCOs in Michigan 1977-2005. (Wires et al. 2001a, Weseloh et al. 2006)

In 1989, approximately 5,000 pairs of DCCOs were counted in the state (Figure 3). In 1997, 30,458 pairs were counted. In recent years, the MI DCCO population appears to be stabilizing although there have been some local decreases (MDNR 2005). In 2005, approximately 29,987 pairs were counted (Weseloh et al. 2006). Estimates of 0.6 to 4.0 non-breeding cormorants per breeding pair have been used for several populations (Tyson et al. 1999). Using an estimate of 0.6 non-breeding birds per breeding pair, the 2005 spring/summer cormorant population in Michigan can be conservatively estimated at 77,900 birds.

Based on current and anticipated future requests for CDM, WS anticipates that no more than 9,000 DCCOs could be taken per year by WS under Alternative 6. The EA predicted that approximately 621 DCCOs would be lethally removed by the State or Tribes under the PRDO. MDNR and tribal take of DCCOs is not anticipated to increase beyond levels predicted in the EA. This estimate of State and Tribal take is provided for the purpose of estimating cumulative impacts on the DCCO population and is not a binding limit on State or Tribal activity. Based on data from 2004 and 2005, WS anticipates that annual DCCO take under depredation permits and scientific collecting permits will not exceed 300 and 500 DCCOs respectively. Table 1 provides a summary of DCCO take in 2004 and 2005 and maximum DCCO take anticipated under Alternative 6.

In 2004 eggs in a total of 3,114 nests were oiled during cumulative CDM efforts by all entities in Michigan and in 2005 a total of 2,991 nests were oiled. The EIS stated that since DCCOs are relatively long-lived birds, egg oiling would have to be conducted repeatedly over a period of years before any impact on adult populations would be evident. The EIS also determined that without extensive regional coordination of efforts the overall impact of egg oiling on the continental and regional DCCO populations would likely be minimal. On a local level, oiling a high proportion of nests in a colony can reduce the number of DCCOs in a colony over time. Collectively, the individual CDM egg oiling projects may result in a reduction in the state DCCO population. WS, the USFWS and the MDNR will monitor the cumulative impacts of CDM on DCCO populations in the state. Cumulative impacts of individual management programs are not anticipated to reduce the State DCCO population by more than 50% of 2005 levels, which would be approximately 15,000 pairs of DCCOs plus non-breeding individuals. If monitoring indicates the DCCO population is approaching this level, further analysis pursuant to NEPA and management decisions will be adjusted based on that analysis.

In the short term, the proposed annual cumulative take of DCCOs by all sources (10,500 DCCOs) would only be 13.5% of the estimated 77,900 birds in the state in 2005. Over a period of years, the cumulative impacts of CDM activities at specific sites may result in reductions in the total number of DCCOs in the State. As stated above, cumulative impacts of individual management programs are not anticipated to reduce the State DCCO population by more than 50% of 2005 levels, which would be approximately 15,000 pairs of DCCOs plus non-breeding individuals. Monitoring of breeding colony numbers will be done annually at the sites where CDM is conducted. The number of breeding DCCOs will be counted each year at the sites where WS conducts CDM. If monitoring indicates the DCCO population is approaching this level, further analysis pursuant to NEPA will be conducted and management decisions will be adjusted based on that analysis.

Assuming an annual rate of increase of approximately 28.7% between 1989 and 1997, the DCCO population was at or exceeded 15,000 pairs in 1993-1994 and had increased to the current level of 30,458 pairs by 1997. Consequently, reducing the number of breeding pairs in the state to approximately 15,000 pairs would not jeopardize the viability of the State DCCO population. It would merely serve to bring the Michigan population back in line with that which existed in the early 1990s, and would also be about 3

times the estimated population that existed in 1989. Because the population increased when it was at those levels, it is reasonable to conclude that those levels were viable and, at a minimum, capable of sustaining themselves.

Table 1. Summary of Cumulative Bird Take for Michigan. Numbers are for adult birds and do not include eggs oiled.

Source of Take	2004 Actual	2005 Actual/	Maximum annual take anticipated under Alternative 6
WS – PRDO	802	2,251	9,000
State/Tribes - PRDO	222	178	700
Depredation Permits	155	199	300
Scientific Collecting Permits	400	350	500
TOTAL	1,579	2,978	10,500

The FEIS (USFWS 2003) predicted that based on requests for assistance with DCCO damage to public resources and existing CDM activity, an average of 4,140 DCCOs would be taken per year for an annual maximum take of 99,360 DCCOs (4,140 x 24 states that are able to implement the PRDO). The FEIS determined that this level of take would still allow for a healthy viable DCCO population. In the original Michigan DCCO EA used the FEIS prediction for annual DCCO take under the PRDO (4,140 DCCOs per year) and an estimate of cumulative take of 6,650 DCCOs that was also based on data from the FEIS. The DCCO population is not evenly distributed among states (Weseloh et al. 2005, Wires et al. 2001), and it is unlikely that all states will have the same level of conflicts with DCCOs. Michigan is considered by Wires et al. (2001a) to have the largest breeding population in the U.S. Great Lakes. In 2005, only 7 states killed birds during efforts to protect public resources (Alabama, Arkansas, Michigan, Minnesota, New York, Texas, and Vermont; USFWS 2006). Consequently, the average predicted take of 4,140 DCCOs per state per year has, thus far, been an overestimate.

Data reported to the USFWS in 2005 indicate that a total of 11,730 DCCOs were taken by all states authorized under the PRDO (USFWS 2006). The anticipated increase in Michigan DCCO take under the PRDO from 4,140 to a maximum of 9,700 (Total for WS, State and Tribes) would still leave cumulative national annual take under the PRDO well under the 99,360 DCCOs that the FEIS determined would not have a significant adverse impact on the regional or national DCCO population. Each year, the States, Tribes and WS inform the USFWS of their intent to take action under the PRDO prior to starting CDM. These entities also provide detailed reports to the USFWS on the exact actions taken at the end of the year. Through monitoring and oversight of these notices and reports and data on the DCCO population the USFWS ensures that total take does not exceed that predicted in the FEIS and that the cumulative impact of the proposed action is not having an adverse impact on the regional or national DCCO population.

5.2 Effects on Other Wildlife Species

Adverse Impacts on Non-target Species (Not Threatened or Endangered Species). Direct impacts on non-target species occur when program personnel inadvertently kill, injure, or harass animals that are not target species, including eggs or young of nesting adults that are disturbed by CDM activities. These impacts are addressed in the EA (USDA 2004) and FEIS (USFWS 2003). The most likely negative effect on non-target species from CDM activities in Michigan is disturbance of co-nesting colonial waterbirds. WS determines the non-target species present prior to conducting work at any site and Chapter 3 of the EA

includes Standard Operating Procedures (SOPs) for the protection of nontarget species. If adults are startled from the nest for too long or at the wrong time of day, there is potential for increased mortality rates for eggs and chicks. However, in most instances, migratory birds and other affected non-target wildlife may temporarily leave the immediate vicinity of scaring, but usually return after conclusion of the action. Moore et al. (2005) evaluated the impact of DCCO removal on co-nesting great blue herons and great egrets on Lake Ontario. For both species, there was no impact on the proportion of time spent in nest attendance between control and treatment sites for the interval prior to DCCO removal, the intervals between DCCO removal efforts and the period after DCCO removal was completed. Nest attendance declined for both species during the DCCO removal periods (35 ± 20 min). Herons disturbed during the DCCO removal returned to the nest in 11 - 14 min (longest unattended= 50 ± 30 min) and all egrets returned to nests before the cormorant removal had ended (longest unattended= 6 ± 4 min). There was no difference in the nest success of herons or egrets between treated and untreated sites. As discussed in Section 1.5.6.3 the lead and cooperating agencies would continue to monitor the impacts of DCCO removal on co-nesting species. Precautions used to minimize the likelihood and duration of impacts on co-nesting birds are listed in the SOPs in Chapter 3 of the EA.

In general, there are 5 major factors which should be considered when working to reduce impacts on co-nesting birds. WS will include these considerations when developing site-specific management plans.

1. Timing of CDM relative to the breeding cycle of co-nesting birds. Co-nesting birds may be more likely to abandon sites very early in the breeding cycle before they have much investment in a nest or eggs. Damage management activities that occur after chicks have hatched pose high risks to co-nesting birds because chicks may panic and jump/fall out of the nests. For birds with nests in trees and shrubs, the fall from the nest may result in death or fatal injury of the chicks, and adults are unlikely to be able to adequately care for offspring which have fallen out of the nest.
2. Duration and timing of visit. Shorter visits have less impact on co-nesting species. Visits should be scheduled to avoid periods of extremely hot or cold weather when moving adults from nests may have adverse impacts on eggs and chicks.
3. Sensitivity of the control crew. Crews should retain a continual awareness of the response of co-nesting birds to CDM activities and respond accordingly. Examples of adjustments that may be made to minimize impacts may include use of small caliber firearms or rifles with suppressers, restricting egg oiling to ground nests that can be reached by CDM crews with minimal disruption to co-nesting birds, and the use of blinds. In some instances it may be necessary to discontinue efforts for the day and adjust subsequent efforts to minimize disturbance.
4. Species composition. In general, the potential for disruption increases as the number of species at a site increases. Species that may usually be relatively tolerant of human presence may be more likely to flush from the nest if co-nesting bird species are agitated. The nature of the co-nesting species at the site will also have an impact. For example, co-nesting gulls may prey on the nests and chicks of adults that flush from their nests in response to human activity. Conducting CDM activities at night with specialized equipment can help reduce the instance of birds flushing from the nests and associated risk of gull predation in some situations. However, some species are less tolerant of night activity than CDM during the day. Safety concerns for crews may also limit the use of evening CDM activities.
5. Frequency of visits. Minimizing the frequency of visits helps to minimize the disruption to co-nesting species. For example, the East Lansing Field Office of the USFWS has recommended minimizing the number of trips to the colony to pick up carcasses of birds shot during CDM efforts. Combining

activities like carcass retrieval and nest oiling can also minimize the number of trips to a site.

It is extremely unlikely that a non-target species would be shot. No non-target birds or mammals have been killed by WS during CDM operations in Michigan (MIS 2005 database). While every precaution is taken to safeguard against taking non-target birds, at times changes in local flight patterns and other unanticipated events can result in the incidental take of unintended individuals. These occurrences are rare and should not affect the overall populations of any species under the proposed program. Mitigation measures to reduce potential impacts to non-target species, especially nesting birds, are listed in Chapter 3 of the EA.

Given the data available, the SOPs established for the protection of non-target species (Chapter 3 of the EA), and the fact that the agencies will continue to evaluate impacts on non-target species and adjust management techniques accordingly, the CDM activities proposed in this alternative will have a low magnitude of impact on non-target species.

Beneficial Impacts on Non-target Species (Not Threatened or Endangered Species). High numbers of DCCOs can have adverse impacts on vegetation, co-nesting colonial waterbirds and local fish populations (EA Sections 1.2.2 and 1.2.3; USFWS 2003). This alternative allows CDM actions to be conducted for the enhancement of free-swimming fish populations, animals and vegetation (e.g., co-nesting birds, rare plant communities, recreational fish populations). The new CDM projects proposed under this alternative are specifically intended for the protection of public resources. This alternative has the greatest possibility of successfully reducing cormorant damage and conflicts to wildlife species since all CDM methods could possibly be implemented or recommended by WS and WS would be able to respond to all requests for assistance with DCCO damage to public resources.

Threatened and Endangered Species Impacts. Impacts on Federally listed species and provisions for reducing impacts on those species are provided in the FEIS (USFWS 2003), and in an Intra-Service Section 7 Biological Evaluation (posted at <http://www.fws.gov/midwest/MICormorantNEPA>). WS will consult with the USFWS and the MDNR regarding the presence of state-listed species in areas where it proposes to work. WS will adhere to the provisions provided in the FEIS (USFWS 2003), the EA and 50 CFR 21.48 for the protection of listed species, and will reinstate consultation with the USFWS and MDNR to address species not addressed in these prior consults as needed. Therefore, the proposed actions will not adversely affect Federally listed threatened or endangered species.

5.3 Effects on Human Health and Safety

4.3.1 Effects on Human Health and Safety from CDM Methods

The methods used for CDM under Alternative 6 are the same as those used for Alternative 1. Although these methods would be used more than under Alternative 1, a risk assessment for the national WS program determined that risks to human safety from the proposed methods were low (USDA 1997, Appendix P). Agents acting under the authority provided to WS to conduct to protect public resources (50 CFR 21.48(c)(2)) will be informed and trained in the safe and proper use of CDM methods including the use of firearms. There have been no adverse impacts on human safety from CDM actions conducted since the EA was completed. Therefore, no adverse effects on human safety from WS' use of these methods are expected for this Alternative 6.

4.3.2. Effects on Human Health and Safety from Not Conducting CDM.

This alternative differs from Alternative 1 only in the amount of CDM that would be conducted under the PRDO. These actions are not being conducted for the protection of human health and safety. Therefore, the impacts Alternative 6 are the same as for Alternative 1.

5.4 Effects on Aesthetic Values

Some people who routinely view individual birds or flocks of cormorants would likely be disturbed by the increased removal of such birds under the current program. The agencies are aware of such concerns and takes this into consideration when planning CDM activities. None of the proposed actions will eliminate all DCCOs from any site and DCCO viewing opportunities will continue to be available at all locations. Cormorant Damage Management activities will also be scheduled to minimize impacts on recreational use of these sites. For example, South Manitou Island gets many visitors, especially after Memorial Day. Wildlife Services will work with the NPS to time damage management activities to avoid periods of public use.

Some people have been opposed to the killing of any birds during CDM activities. Under this alternative, more lethal removal of DCCOs would occur than under any of the other alternatives. People who are opposed to lethal methods would likely have stronger objections to this alternative than Alternative 1. However some persons who voice their opposition have no direct connection or opportunity to view or enjoy the particular birds that would be killed by WS' lethal control activities. Lethal control actions would generally be restricted to local sites. None of the proposed actions will be conducted with the intent of removing all DCCOs from any given site. As discussed above, DCCOs would remain common and abundant, and would be available for viewing by persons with that interest. Lethal removal of cormorants from airports should not affect the public's enjoyment of the aesthetics of the environment since airport properties are closed to public access. Viewing and interacting with cormorants at these sites are usually either restricted to viewing from a location outside boundary fences or are forbidden.

In some instances, large roosting or nesting populations of cormorants can destroy habitat and displace other nesting birds, reducing the aesthetic value for some people. For example, the CDM proposed for South Manitou Island is intended to protect the distinctive habitat at that site. Similarly, CDM activities conducted to protect fishery resources should have beneficial impacts on the enjoyment that anglers experience through recreational fishing.

5.5 Humaneness and Animal Welfare Concerns of the Methods Used

Under this alternative, methods viewed by some persons as inhumane would be used in CDM by WS. Shooting, when performed by experienced professionals, usually results in a quick death for target birds. Occasionally, however, some birds are initially wounded and must be shot a second time or must be caught by hand and then euthanized. Some persons would view shooting as inhumane. People who view these methods as inhumane will find this alternative the most objectionable because more lethal removal of DCCOs will occur under this alternative than any of the other alternatives.

Occasionally, cormorants captured alive would be euthanized. The most common method of euthanasia would be by cervical dislocation or CO₂ gas. These methods are described and approved by AVMA as humane euthanasia methods (Beaver et al. 2001). Most people would view AVMA approved euthanasia methods as humane.

Michigan WS personnel are experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology, workforce and funding. Mitigation measures/SOPs used to maximize humaneness are listed in Chapter 3. WS has improved the selectivity and humaneness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some CDM methods are used in situations where non-lethal damage management methods are not practical or effective.

VI. CUMULATIVE IMPACTS

Cumulative impacts, as defined by Council on Environmental Quality (40 CFR 1508.7), are impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

Under Alternatives 1, 2, 3, 5 and 6 WS would address damage associated with cormorants in a number of situations throughout the State. The WS CDM program would be the primary Federal program with CDM responsibilities; however, some state and tribal agencies may conduct CDM activities in Michigan as well, and governmental agencies and private individuals can take birds under migratory bird depredation and scientific collecting permits. Through ongoing coordination with these entities, WS is aware of such CDM activities and may provide technical assistance in such efforts. WS does not normally conduct direct damage management activities concurrently with such agencies in the same area, but may conduct CDM activities at adjacent sites within the same time frame. In addition, private individuals may conduct CDM activities in the same area as WS. The potential cumulative impacts analyzed below could occur either as a result of WS CDM program activities over time, or as a result of the aggregate effects of those activities combined with the activities of other agencies and individuals.

Cumulative Impacts on Wildlife Populations

Cormorant damage management methods used or recommended by the WS program in Michigan could result in a reduction in the State DCCO population, but the reduction will not jeopardize the health or viability of the DCCO population. The proposed action will likely have no cumulative adverse effects on non-target wildlife populations. The intent and expected result of this program is not to reduce the statewide population but to move or reduce the size of local groups of birds to address specific DCCO damage problems. Wildlife Service's limited lethal take of DCCOs is anticipated to have minimal impacts on DCCO populations in Michigan, the region, and the U.S. Population trend data and information provided in the FWS FEIS (USFWS 2003) indicate that cormorant populations have increased for Michigan, the region and the U.S. over the past 20 years. When control actions are implemented by WS the potential lethal take of non-target wildlife species is expected to be minimal to non-existent.

Cumulative Impact Potential from CDM Methods

Cormorant damage management methods used or recommended by WS may include exclusion through use of various barriers, habitat modification of structures or vegetation, live trapping and euthanasia of birds, harassment of birds or bird flocks, nest and egg destruction, and shooting. No cumulative or long-term adverse effects are anticipated from implementation of these CDM methods.

Summary

No significant cumulative impacts on the human environment are expected from any of the six alternatives.

Under the Proposed Action, the lethal removal of DCCOs by the lead and cooperating agencies would not have an adverse impact on the long-term sustainability of DCCO populations in Michigan, the Region or the United States, but some local reductions would occur. Given the SOPs for the protection of nontarget species in Chapter 3 of the EA and WS' commitment to adhere to all USFWS and MDNR recommendations and requirements for the protection of State and Federally-listed threatened and endangered species, the Proposed Action will not adversely impact nontarget species populations. No risk to public safety is expected when WS' services are provided and accepted by requesting individuals in Alternatives 1, 2, 3, 5 and 6 because only trained and experienced wildlife biologists/specialists and designated agents would conduct and recommend CDM activities. There is a slight increased risk to public safety when persons who reject WS assistance and recommendations conduct their own CDM activities, and when no WS assistance is provided in Alternative 4. In all six alternatives, however, this increase would not result in significant impacts.

Although some persons will likely be opposed to WS' participation in CDM activities on public and private lands within the state of Michigan, the analysis in the EA and amendment indicates that WS Integrated CDM program will not result in significant cumulative adverse impacts on the quality of the human environment.

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VIII. ACRONYMS

ADC	Animal Damage Control
APHIS	Animal and Plant Health Inspection Service
CDM	Cormorant Damage Management
CPUE	Catch Per Unit Effort
DCCO	Double-crested Cormorant
EA	Environmental Assessment
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
LCI	Les Cheneaux Islands
MDNR	Michigan Department of Natural Resources
MBTA	Migratory Bird Treaty Act
MIS	Management Information System

NPS	National Park Service
NEPA	National Environmental Policy Act
PRDO	Public Resource Depredation Order
SMI	South Manitou Island
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFWS	U.S. Fish and Wildlife Service
WS	Wildlife Services

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